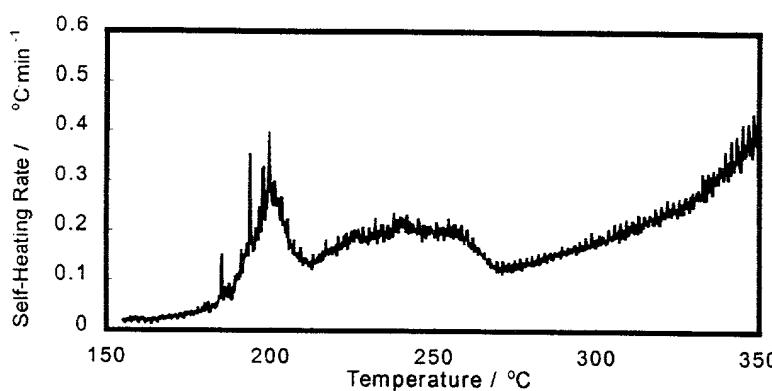
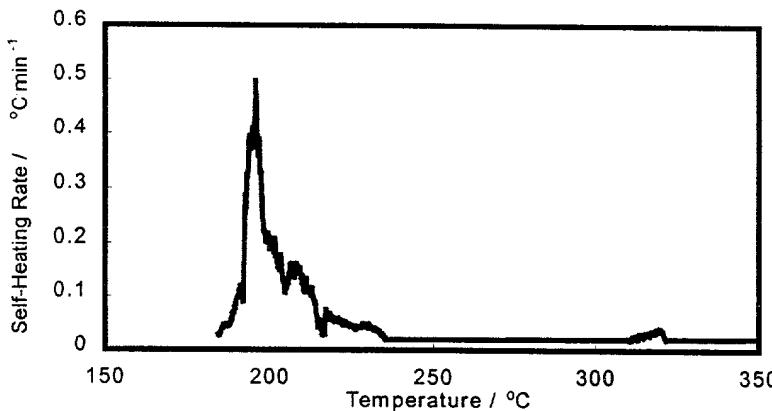


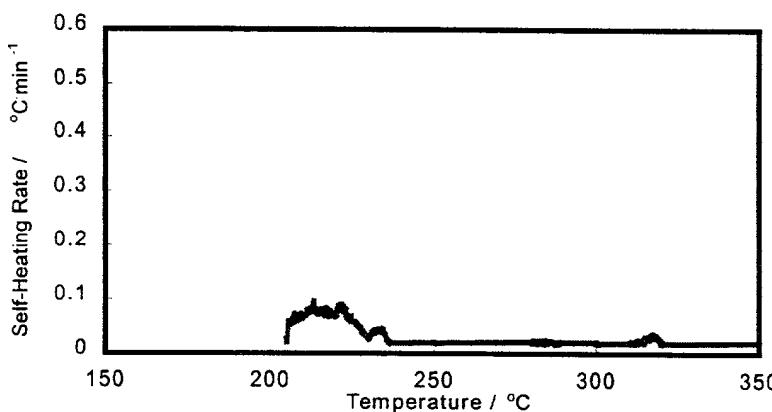
Fig.1 Cyclic performance of lithium ion cell with 5 wt% VEC (curve A), with 5 wt% TPP (curve B) and with 2 wt% VEC + 2 wt% TPP + 1 wt% DMP mixture (curve C) flame retardant.



(A) with 5 wt% VEC

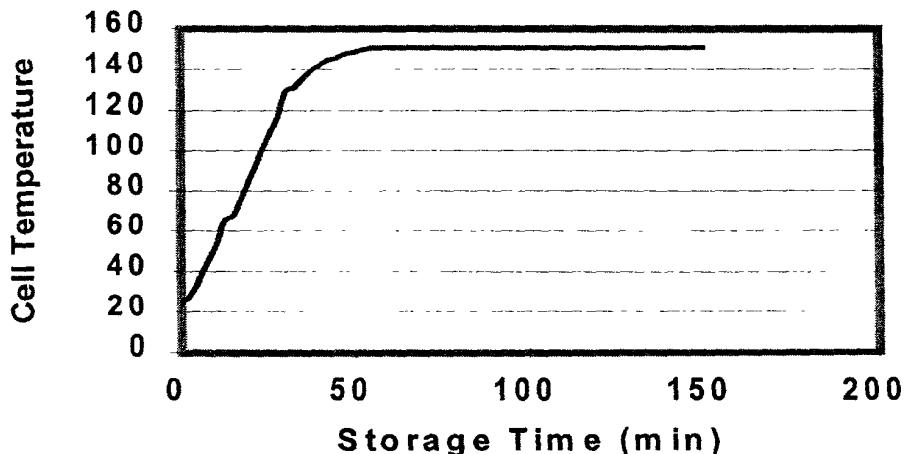


(B) with 5 wt% TPP

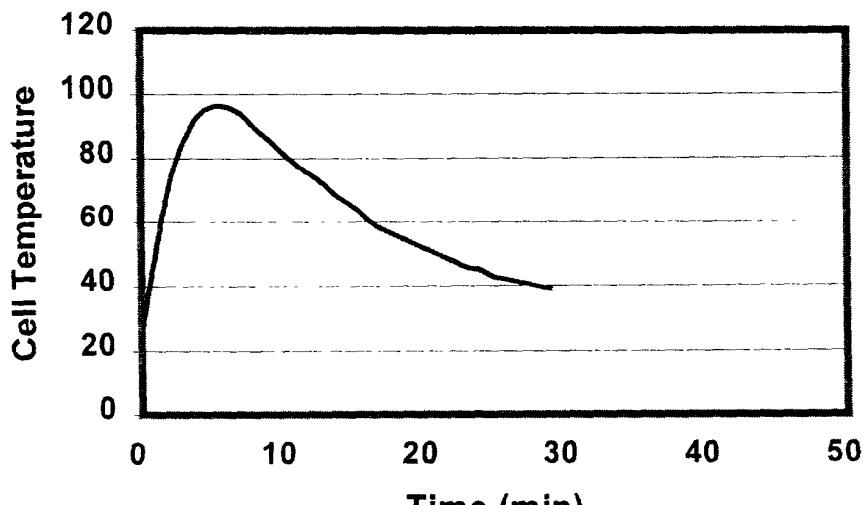


(C) with mixture of 2 wt% VEC, 2 wt% TPP, and 1 wt% MDP

Fig.2. Self Heat rate from ARC experiment of the reaction between fully charged graphite anode and LiPF<sub>6</sub>/EC/DEC electrolyte with 5 wt% VEC (Fig.2A), with 5 wt% TPP (Fig.2B) and with 2 wt% VEC + 2 wt% TPP + 1 wt% DMP mixture (Fig.2C) flame retardant.



(A) Oven test



(B) Nail penetration test

Fig.3. Oven test (Fig.3A) and nail penetration test (Fig.3B) of 180 mAh prismatic cells containing mixture of 2 wt% VEC, 2 wt% TPP, and 1 wt% MDP as flame retardant.

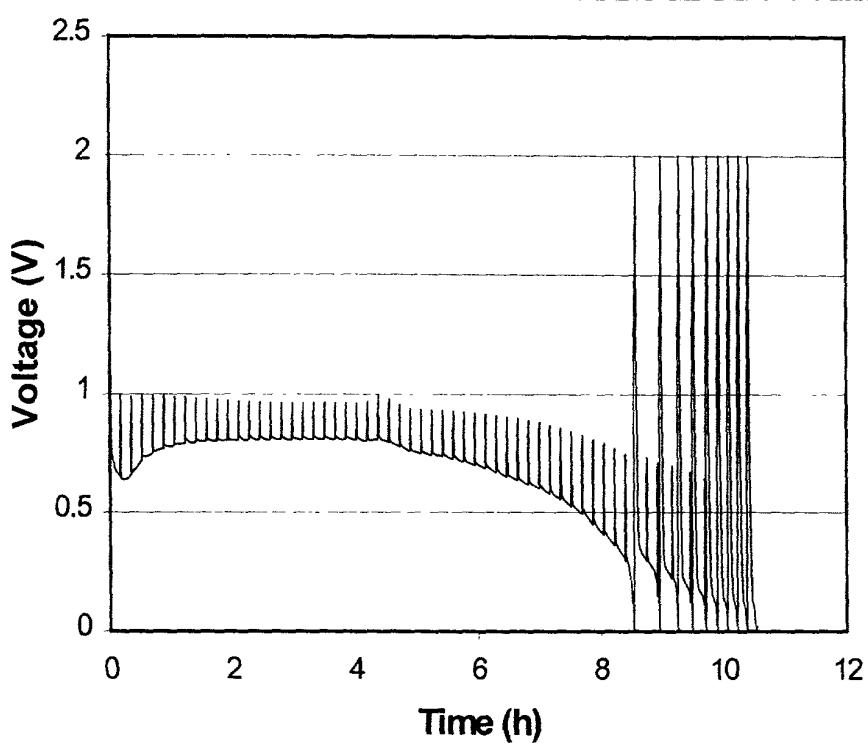


Fig.4 A charge & discharge curve of half cell: NG (a crystalline natural graphite)/Li with 1.2MLiPF<sub>6</sub> in 2EC7PCMEC electrolyte (no additive). The current density is 0.625 mA/cm<sup>2</sup>

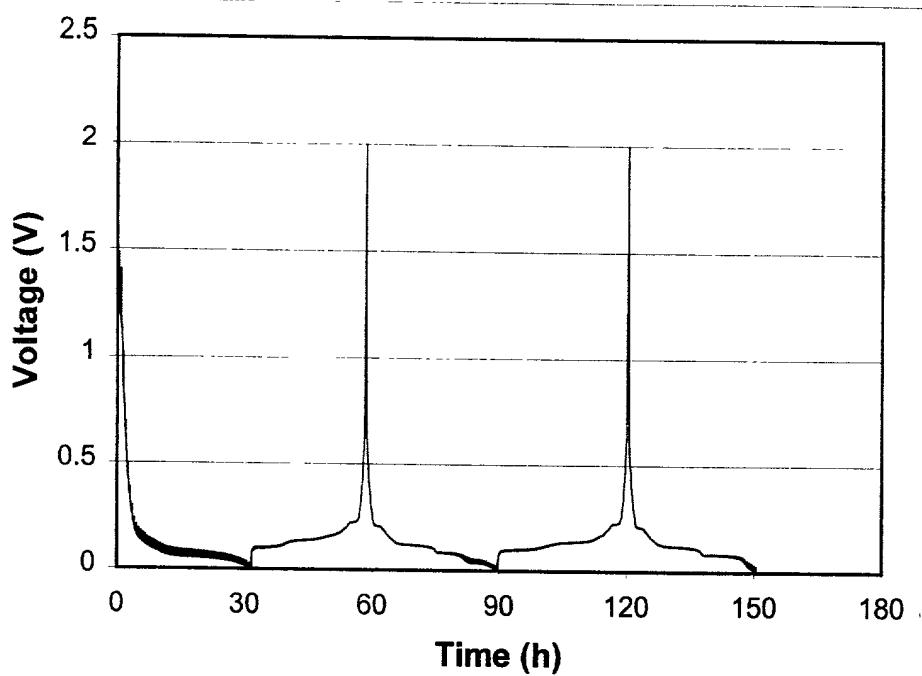


Fig.5 A charge & discharge curve of half cell: NG ( a crystalline natural graphite)/Li with 1.2MLiPF<sub>6</sub> in 2EC7PCMEC electrolyte (with 2wt% 4,5-diphenyl-1,3-dioxol-2-one additive). The current density is 0.625 mA/cm<sup>2</sup>

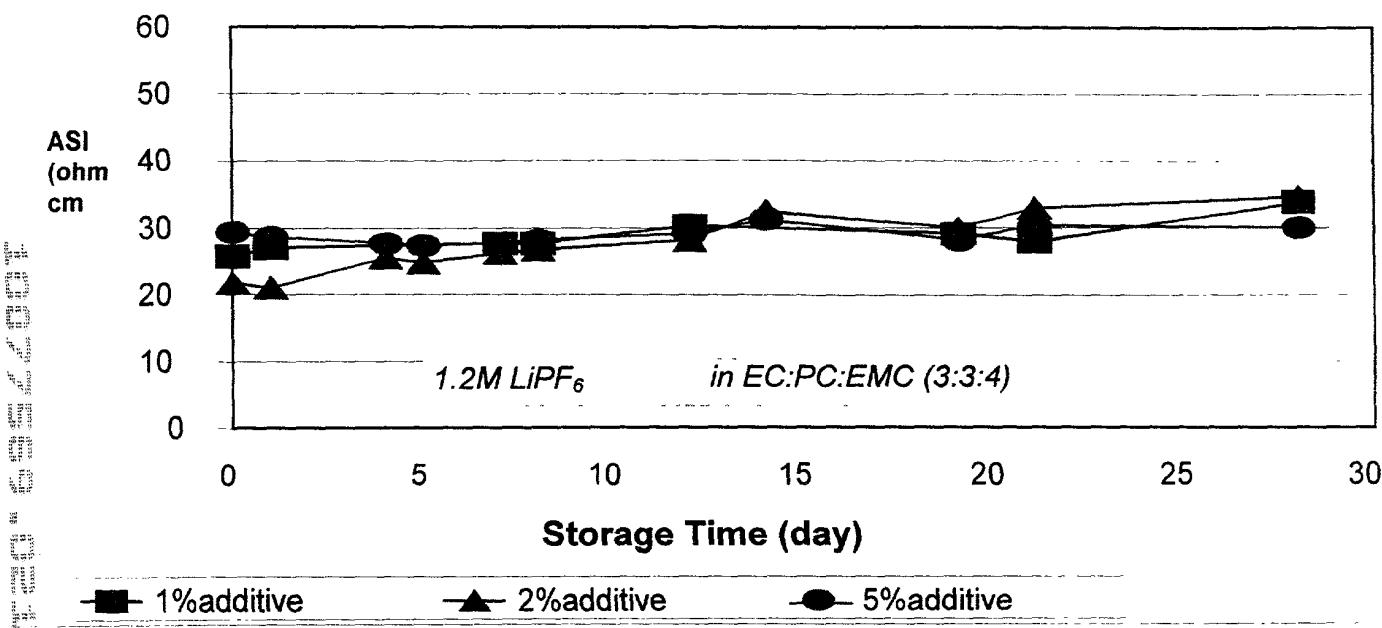


Fig. 6 Area Specific Impedance (ASI) change during 50°C storage of half-cell: NG ( a crystalline natural graphite)/Li with 1.2M LiPF<sub>6</sub> in 2EC:&PC:1MEC electrolyte ( with 1wt%, 2wt% and 5wt% of 4,5-diphenyl-1,3-dioxol-2-one additive)

Figure 7

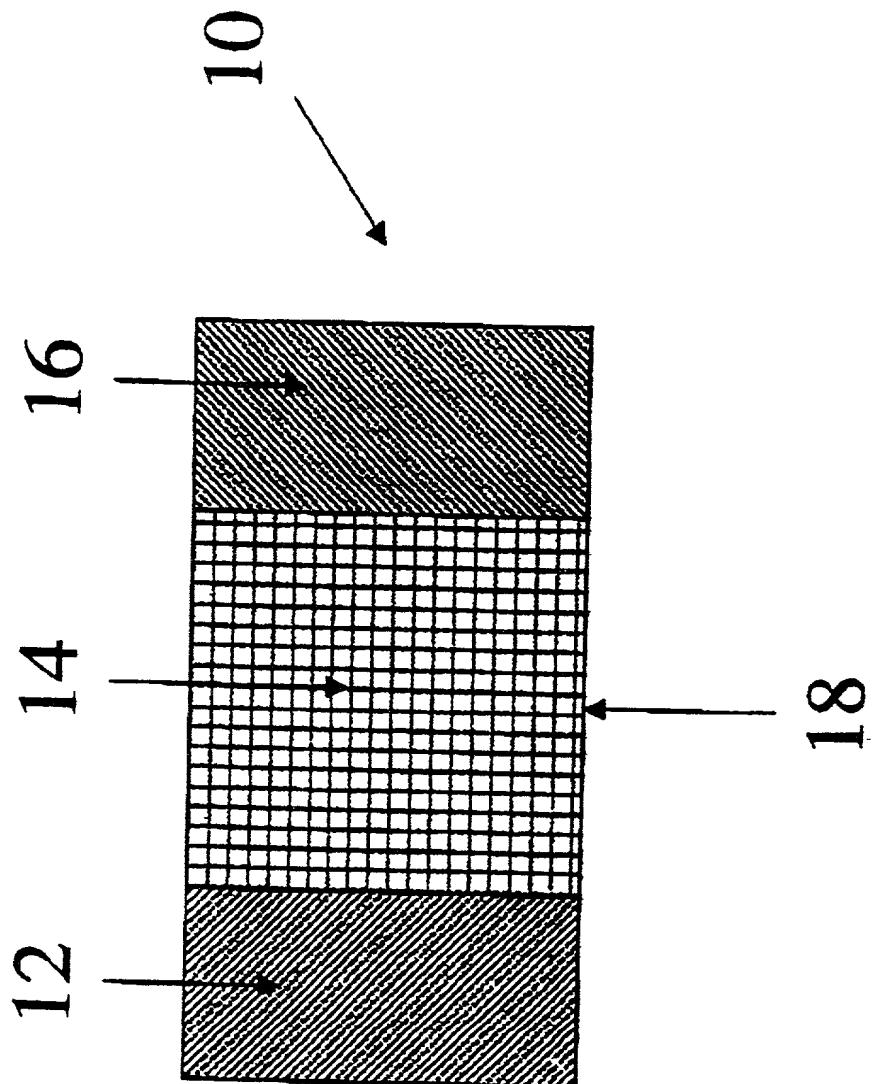


Figure 8

